

WHAT IS CLAIMED IS:

1 A system including:

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an elongate exovascular probe, including proximal and distal ends, the probe including an outer dimension that is less than about 18 millimeters to permit the probe to be introduced through a similarly-sized minimally-invasive opening in a portion of a subject's skull and exovascularly advanced to an aneurysm within the skull; and

an aneurysm treatment device carried by the probe and dimensioned to permit the aneurysm treatment device to be introduced through the opening.

2. The system of claim 1, further including an imaging device to permit viewing of an image of both the aneurysm treatment device and the aneurysm.

3. The system of claim 2, in which the imaging device includes a magnetic resonance (MR) imaging device.

4. The system of claim 3, in which the imaging device further includes a local MR imaging device near the distal end of the probe.

5. The system of claim 4, in which the local MR imaging device includes at least one microcoil.

6. The system of claim 2, in which the imaging device includes a computed tomography (CT) imaging device.

7. The system of claim 1, in which at least one of the aneurysm treatment device and the distal end of the probe includes at least one of an MR or CT imagable fiducial structure.

8. The system of claim 1, in which the probe and aneurysm treatment device are both at least one of MR or CT compatible.
9. The system of claim 1, in which the aneurysm treatment device includes a structure having substantially open and substantially closed positions, wherein the open position is sized to permit at least one portion of the aneurysm treatment device to be positioned around at least a portion of at least one of a saccular, globular, or giant aneurysm, and wherein the closed position is sized to permit the at least one portion of the aneurysm treatment device to press against at least a portion of the aneurysm.
10. The system of claim 9, in which the aneurysm treatment device structure includes a shape-memory property.
11. The system of claim 10, in which the shape-memory property, in the absence of applied bias, is associated with one of the open or closed positions.
12. The system of claim 1, further including an elongate member shaped to extend through a lumen in the probe, the elongate member releasably coupling to the aneurysm treatment device.
13. The system of claim 1, in which the aneurysm treatment device is shaped to be extendable from and retractable into a lumen of the probe.
14. The system of claim 1, in which the aneurysm treatment device includes at least one of a clip, a clasp, a snare, a loop, a hook, a staple, or an electrode.
15. The system of claim 14, in which the clip includes first and second electrodes.

16. The system of claim 1, in which the aneurysm treatment device includes a normally substantially open clip that is substantially closed when retracted into a lumen of the probe, and further including:

an elongate tube shaped to extend through the lumen of the probe, a distal end of the elongate tube shaped to extend out of the distal end of the probe and around a portion of the clip to substantially close a portion of the clip around a portion of the aneurysm; and

a strand ^{16, 16'} shaped to extend through the elongate tube, and releasably coupled to a portion of the clip.

17. The system of claim 16, further including a ring ¹⁰⁰ shaped to engage the distal end of the elongate tube, the ring shaped to encircle a portion of the clip to hold the clip in the substantially closed position around the portion of the aneurysm.

18. The system of claim 1, in which the aneurysm treatment device includes a snare shaped to extend through a lumen in the probe and to extend out from the distal end of the probe, the snare including a unidirectional retaining mechanism to retain the snare in a closed position after the snare has been positioned around a portion of an aneurysm.

19. The system of claim 18, in which the snare includes a breakaway portion to release a portion of the snare that has been positioned around the portion of the aneurysm.

20. The system of claim 1, in which the aneurysm treatment device includes first and second electrodes, at least one of the first and second electrodes being shaped to extend through a lumen in the probe and to extend out from the distal end of the probe.

21. The system of claim 20, in which the first and second electrodes are shaped to assume a substantially open position, to receive at least a portion of an aneurysm therebetween, when extended out from the distal end of the probe.

22. The system of claim 21, in which the first and second electrodes are also shaped to assume a substantially closed position, to pinch at least a portion of an aneurysm therebetween, when at least partially retracted back into the distal end of the probe.

23. The system of claim 20, in which one of the first and second electrodes includes a roller extendable out of the distal end of the probe.

24. The system of claim 1, further including an entry device, the entry device including:

a first securing mechanism to secure the entry device in association with the subject's skull; and

a second securing mechanism to secure an orientation of a trajectory guide portion of the entry device to define a path between the minimally-invasive opening and the aneurysm.

25. The system of claim 24, further including an imaging device to provide information upon which the orientation of the trajectory guide is determined.

26. A method including:

forming an opening in a subject's skull, the opening having a diameter that is less than or equal to the diameter of a burr hole;

exovascularly inserting a probe through the opening to an aneurysm using real-time or preoperative imaging to guide the probe to the aneurysm;

exovascularly introducing an aneurysm treatment device through a lumen in

the probe to the aneurysm; and

altering a morphology of the aneurysm using the aneurysm treatment device.

27. The method of claim 26, in which the exovascularly inserting the probe through the opening to the aneurysm includes using at least one of magnetic resonance (MR) or computed tomography (CT) imaging.

28. The method of claim 26, in which the exovascularly inserting the probe through the opening to the aneurysm includes visualizing three-dimensional aspects of the aneurysm using computed tomography (CT) imaging.

29. The method of claim 26, in which the exovascularly inserting the probe through the opening to the aneurysm includes using a localized image obtained from an imaging device associated with a distal tip of the probe.

30. The method of claim 26, in which the altering the morphology of the aneurysm includes exovascularly pinching a portion of the aneurysm.

31. The method of claim 26, in which the altering the morphology of the aneurysm includes applying electrical energy to a portion of the aneurysm.

32. A system including:
an elongate exovascular probe, including proximal and distal ends, the probe including an outer dimension that is less than about 18 millimeters to permit the probe to be introduced through a similarly-sized minimally-invasive opening in a portion of a subject's skull and exovascularly advanced to an aneurysm within the skull;
an aneurysm treatment device carried by the probe and dimensioned to permit the aneurysm treatment device to be introduced through the opening; and

~~a~~ local imaging device located near the distal end of the probe.

33. The system of claim 32, in which the local imaging device includes a magnetic resonance (MR) imaging device.

34. The system of claim 32, in which the aneurysm treatment device includes a structure having substantially open and substantially closed positions, wherein the open position is sized to permit at least one portion of the aneurysm treatment device to be positioned around at least a portion of an aneurysm, and wherein the closed position is sized to permit the at least one portion of the aneurysm treatment device to press against at least a portion of the aneurysm.

35. The system of claim 32, further including an entry device shaped to introduce the probe.

36. The system of claim 35, in which the entry device includes:

a first securing mechanism to secure the entry device in association with the subject's skull; and

a second securing mechanism to secure an orientation of a trajectory guide portion of the entry device to define a path between the minimally-invasive opening and the aneurysm.

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